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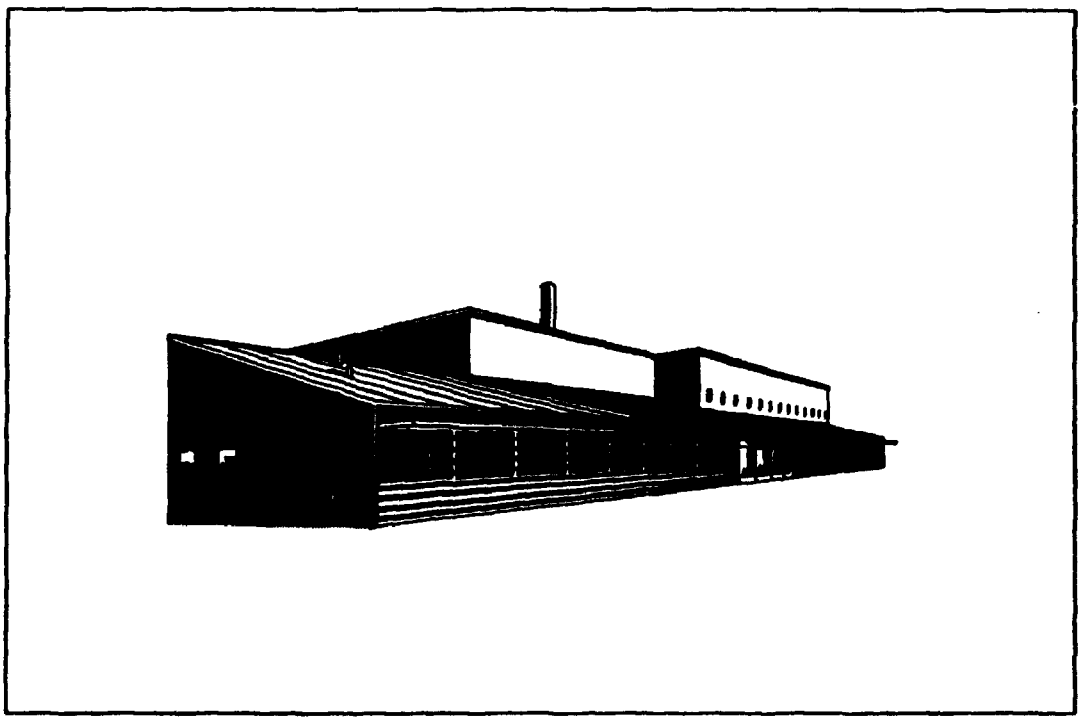

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1. REMOVAL OF LARGE CONTAMINATED EQUIPMENT

The task of cutting and packing of scrap material and experimental equipment from the concrete cell line has been completed.

2. REMOVAL OF LARGE CONTAMINATED FACILITIES

All the concrete cells have now been finally cleaned. The master slave manipulators for all the cells have been removed. All in-cell filters were checked for contamination and replaced with new ones where appropriate.
All the ventilation air from the cells and the rooms passes through absolute filters before it is sent to the chimney. Preliminary smear tests taken in the chimney showed that this is clean.

3. DECONTAMINATION OF CONCRETE CELLS

Vacuuming of the last concrete cell No. 1 continued to a radiation level comparable to the other cells. The contamination and radiation levels were now measured in cells No. 1 to 4 by smear tests and by exposure of thermo-luminescence (TL) dose meters. Smear tests were taken from the table, the floor and the walls of each cell. Eight to ten TL dose meters were placed 130 cm above the table and the floor in each cell in some representative matrix and were exposed for one hour. The readings are assumed to arise from homogeneously distributed contamination on all surfaces.

The smear tests showed β/γ-activity from ^{60}Co, ^{134}Cs, ^{137}Cs, ^{152}Eu and ^{154}Eu. The α-emitters were - with some uncertainty - ^{235}U, ^{238}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{244}Cm and ^{246}Cm.

The results from the TL dose meters are given in Table 1. The derived total contamination per cell is given in Table 2. The results for cells No. 5 and 6 as previously reported are included for convenience; the dose meters for these two cells were placed 115 cm above the surfaces in these cells.

In Tables 1 and 2 are included the dose rate and total contamination in the shutters and shutter housings in their final state, as previously reported.

Based on the results on cells No. 5 and 6 and on the measured radiation levels in the remaining four cells it was concluded that performance of a similar water cleaning of cells No. 1 to 4 would not be justified. The arguments were as follows:

- the "hands-on" work will only transfer the activity to another temporary place, involving doses of up to 20 mSv/man for the available personnel;
- an estimated removal of some 40% of the activity will be helpful later, but it cannot be regarded as an essential benefit now;
- the radiation levels are now so low that final "hands-on" cleaning can be done, if sufficient personnel are available;
- delay of the final cleaning will result in lower doses.

The total amount of contamination left in the concrete cells is of the order of 1850 GBq.

4. COLLECTIVE DOSES

A collective dose of approximately 49 man-mSv was ascribed to 18 persons in the second half of 1993, arising mainly from the in-cell work and from handling of waste.

5. REMAINING WORK

According to the plan the project should be finished now, see the latest revision of the plan in RISØ-HOT-DECOM-P3. The delay is mainly due to:

1) An additional, unforeseen job under item B.2, "Removal of large contaminated equipment", consisting in reception, cutting, packing and shipping of a large amount of scrap material from another site at Risø.
2) A delay of job B.5, "Decontamination of cell ventilators and ducts". This job was planned performed in parallel with job B.4, "Decontamination of concrete cells". This was not possible because the acceptance of the final state for all the concrete cells could first be taken when all the cells were in their present condition.

The remaining work consists in the following tasks:

- checking/cleaning/removal of all remaining cell ventilation equipment and filters;
- leak testing of total cell volume including remaining connected equipment and ducts;
- checking/cleaning/removal of the room ventilation system;
- checking/cleaning of surfaces in all classified rooms;
- removal of the active drains in the building.

The project is planned to be finished by the end of July 1994.
The work that remains to be done is considered relatively conventional. It consists in checking/cleaning/removal of contaminated equipment; any cleaning will be done by simple means.

6. CONCLUSION

The decommissioning work has progressed well during the second half of 1993.

The main result for the period was to obtain the final state for the concrete cell row.
The total amount of contamination left in the concrete cells is of the order of 1850 GBq.
Preliminary smear tests showed that the chimney is most probably clean.
The project was not finished as planned by the end of this year. It will be delayed by some 7 months.

7. ACKNOWLEDGEMENT

All measurements and calculations on activity and contamination were performed by the Applied Health Physics Section of the Safety Department, RISØ.

8. REFERENCES

The present report is the last periodic report for the project.
The full list of periodic reports is as follows:

1) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 1. Periodic Report, Covering July 1 to December 31, 1990, by H. Carlsen, RISØ-HOT-DECOM-P1. February 1991.

2) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 2. Periodic Report, Covering January 1 to June 30, 1991, by H. Carlsen, RISØ-HOT-DECOM-P2. August 1991.

3) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 3. Periodic Report, Covering July 1 to December 31, 1991, by H. Carlsen, RISØ-HOT-DECOM-P3. February 1992.

4) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 4. Periodic Report, Covering January 1 to June 30, 1992, by H. Carlsen, RISØ-HOT-DECOM-P4. August 1992.

5) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 5. Periodic Report, Covering July 1 to December 31, 1992, by H. Carlsen, RISØ-HOT-DECOM-P5. February 1993.

6) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 6. Periodic Report, Covering January 1 to June 30, 1993. by H. Carlsen, RISØ-HOT-DECOM-P6. Rev. October 1993.

7) "Decommissioning of the Risø Hot Cell Facility", Contract FI2D-0011-DK, 7. Periodic Report, Covering July 1 to December 31, 1993, by H. Carlsen, RISØ-HOT-DECOM-P7. February 1994.

Table 1: Final state (dose rate) for the concrete cells.

Dose meter No.	Dose rate [mSv/h]										
	Cell 1 a)	Shutter	Cell 2 a)	Shutter	Cell 3 a)	Shutter	Cell 4 a)	Shutter	Cell 5 b)	Shutter	Cell 6 b)
1	6.0	-	7.0	-	12.0	-	0.40	-	2.0	-	0.50
2	4.5	-	5.5	-	15.0	-	0.45	-	1.8	-	0.55
3	5.4	-	6.0	-	9.0	-	0.50	-	1.6	-	0.50
4	3.0	-	6.0	-	9.0	-	0.50	-	2.0	-	0.70
5	3.3	-	4.5	-	14.0	-	0.85	-	2.7	-	0.40
6	9.5	-	12.0	-	11.0	-	0.50	-	1.9	-	0.40
7	11.0	-	6.0	-	10.0	-	0.50	-	2.0	-	0.90
8	8.6	-	5.0	-	13.0	-	0.70	-	2.3	-	0.40
9	6.8	-	-	-	-	-	-	-	-	-	-
10	6.6	-	-	-	-	-	-	-	-	-	-
Average	6.5	0.026	6.5	0.050	11.6	0.021	0.55	0.015	2.0	0.008	0.54

a) Dose rate at 130 cm above table/floor after remote vacuuming, no in-cell high pressure water jetting.
b) Dose rate at 115 cm above table/floor after remote vacuuming and in-cell high pressure water jetting.

Table 2: Final state (contamination) for the concrete cells.

Dose meter No.	Total contamination [GBq]										
	Cell 1	Shutter	Cell 2	Shutter	Cell 3	Shutter	Cell 4	Shutter	Cell 5	Shutter	Cell 6
1	621	-	389	-	668	-	24	-	89	-	21
2	418	-	397	-	1080	-	27	-	93	-	24
3	590	-	375	-	562	-	35	-	71	-	24
4	279	-	383	-	575	-	35	-	103	-	34
5	342	-	226	-	702	-	49	-	130	-	18
6	829	-	811	-	743	-	31	-	103	-	21
7	992	-	305	-	508	-	34	-	107	-	37
8	778	-	260	-	675	-	40	-	118	-	16
9	613	-	-	-	-	-	-	-	-	-	-
10	576	-	-	-	-	-	-	-	-	-	-
Average	604	0.228	393	0.438	689	0.186	34	0.133	102	0.071	24